

INCREASING THE TOTAL WEIGHT OF FOUR-AXLE VEHICLES **IMPACT ON INFRASTRUCTURE, ENVIRONMENT AND ECONOMY**

Concrete Day 2016, Lisbon, Portugal
Thomas Hoffmann

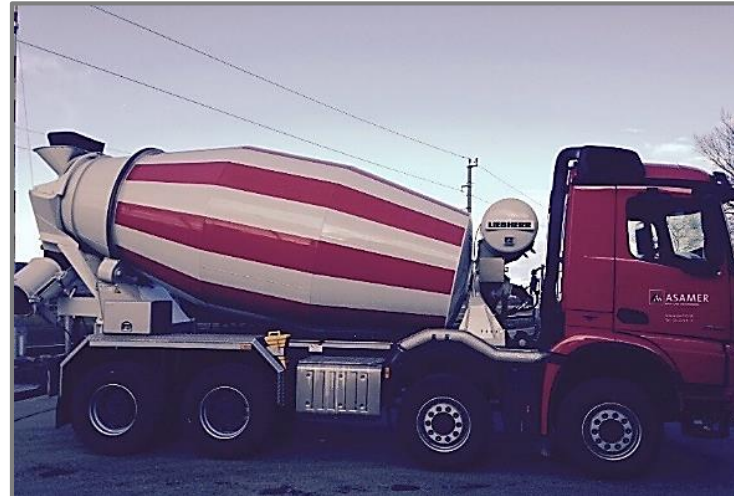
■ Introduction

ERMCO-Initiative

- **Objective:** Increasing the total weight of **four-axle vehicles** from **32 to 35 tons** while maintaining the **maximum weight per axle of 9.5 tons**.
- Despite all arguments, **the proposal was not successful at the European level**.
- National associations are encouraged to **aspire an exception at the national level as foreseen by Council Directive 96/53/EC (12)**.
- Might lead to a future implementation at the European level.



■ Example of a Modified Vehicle (II)



Source: Liebherr GmbH

■ Results of Official Weightings

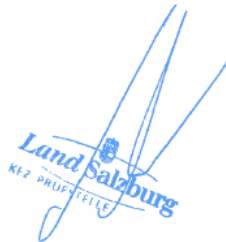
Payload 8.8 m³

Wiegeprotokoll
Amt der Salzburger Landesregierung
KFZ Prüfstelle Salzburg
Karolingerstraße 34 5020 Salzburg

Vorgeworfene GEWICHTE (MIT TOL.-ABZUG):

Achse	1	(49/51)	8660 kg
Achse	2	(50/50)	8180 kg
Achse	3	(46/54)	9660 kg
Achse	4	(47/53)	9640 kg

Gesamtgewicht (48/52) 36140 kg



Payload 9.0 m³

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Vorgeworfene GEWICHTE (MIT TOL.-ABZUG):

Achse	1	(48/52)	8840 kg
Achse	2	(48/52)	8260 kg
Achse	3	(46/54)	9780 kg
Achse	4	(48/52)	9040 kg

Gesamtgewicht (48/52) 35920 kg



Basis: Truck mixer ready for operation (incl. water, AdBlue, fuel, and driver).

Source: Liebherr GmbH

■ Arguments

Ecological Benefits

- **Increasing the capacity of truck mixers naturally lowers the required amount of turns.**
- **Every 8th turn of a truck mixer is no longer required.**
- **Annual savings in the European ready-mixed concrete industry:**
 - ✓ Reduction of mileage: 149 million kilometers.
 - ✓ Reduction of fuel consumption: 51 million liters of Diesel.
 - ✓ Reduction of CO₂-Emissions: 165.000 tons.
- **Leads to a modernization of the truck fleet (EURO-6).**
- **The ERMCO proposal helps to achieve the EU-Target: Reducing the CO₂ Emissions about 20% until 2020!**

■ Arguments

Traffic Systems and Economic Benefits

■ **Helps to decrease traffic density**

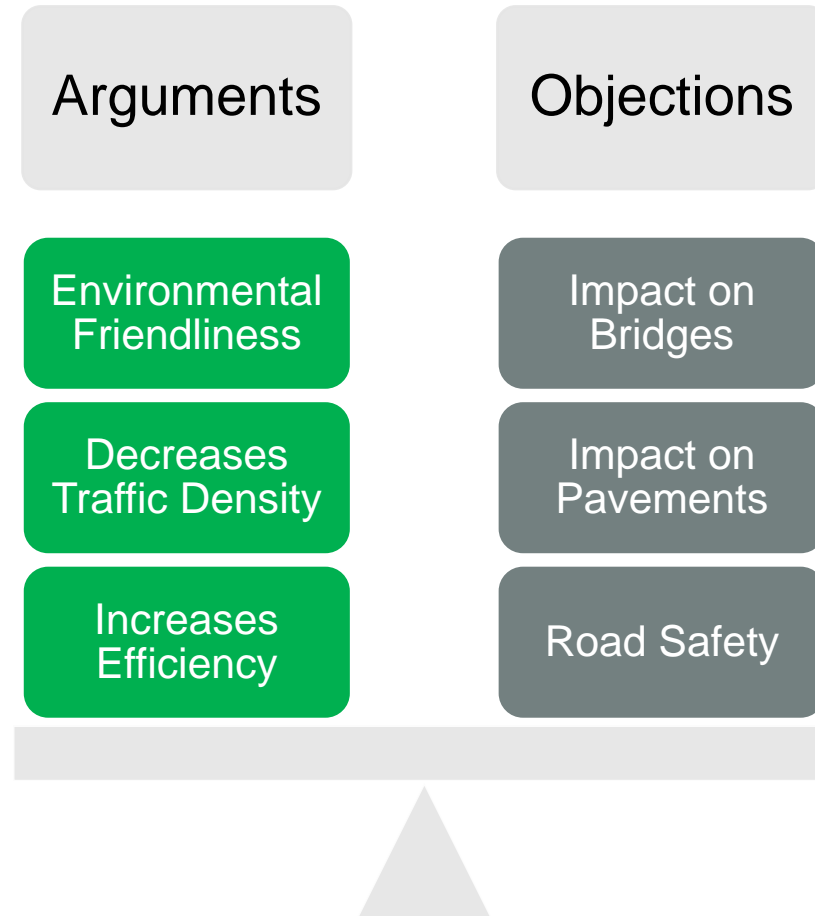
- The limits of traffic systems are reached.
- Reduces the burden on public roads.
- Ready-mixed concrete depends on road transportation (not substitutable by rail transportation).

■ **Increases the economic efficiency**

- Better utilization of fleet and staff.
- Higher security of supply for building sites.
- Lowers the transportation costs.

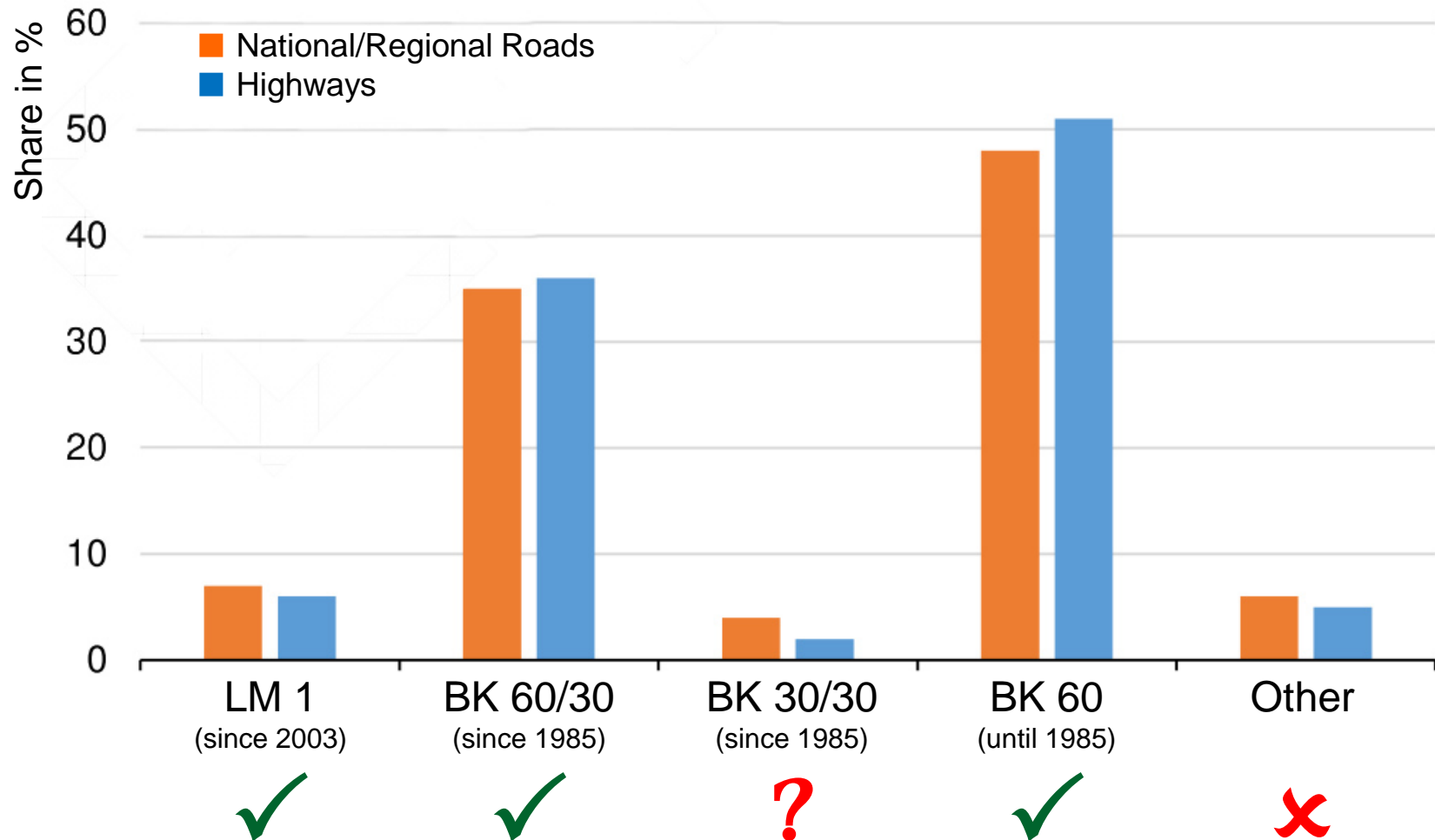


■ Argumentation



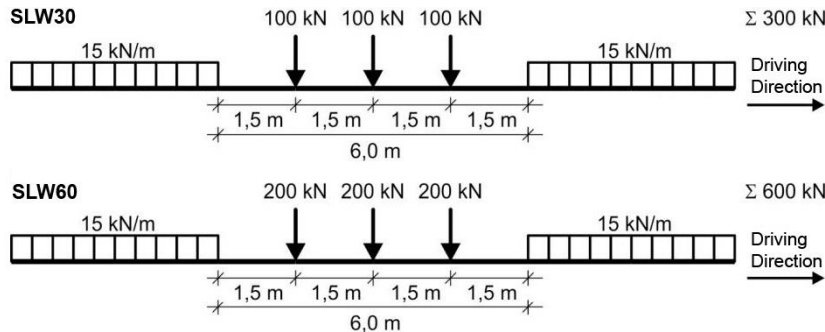
■ Impact on Bridge Structures (I)

Bridge Infrastructure in Germany



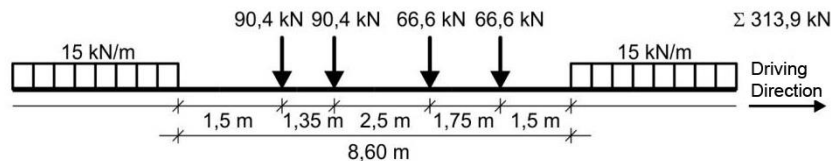
Impact on Bridge Structures (II)

Normative Load Models



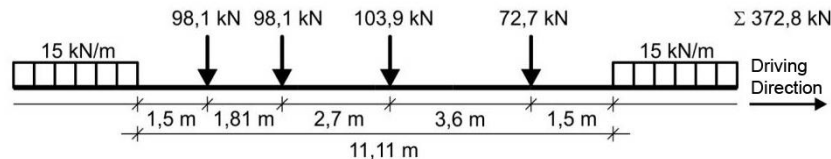
Normative Load Models According to DIN 1072

Load Model 32t (as permitted)



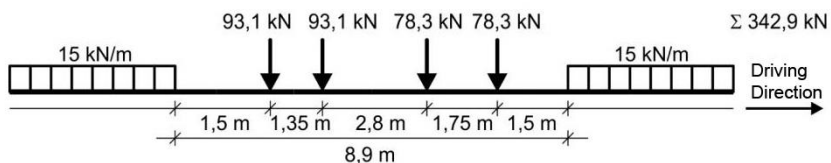
Permitted 32 tons
4-Axle Vehicle

Load Model 38t (as permitted)



Permitted 38 tons
4-Axle Truck & Trailer Vehicle

Load Model 35t (as proposed)



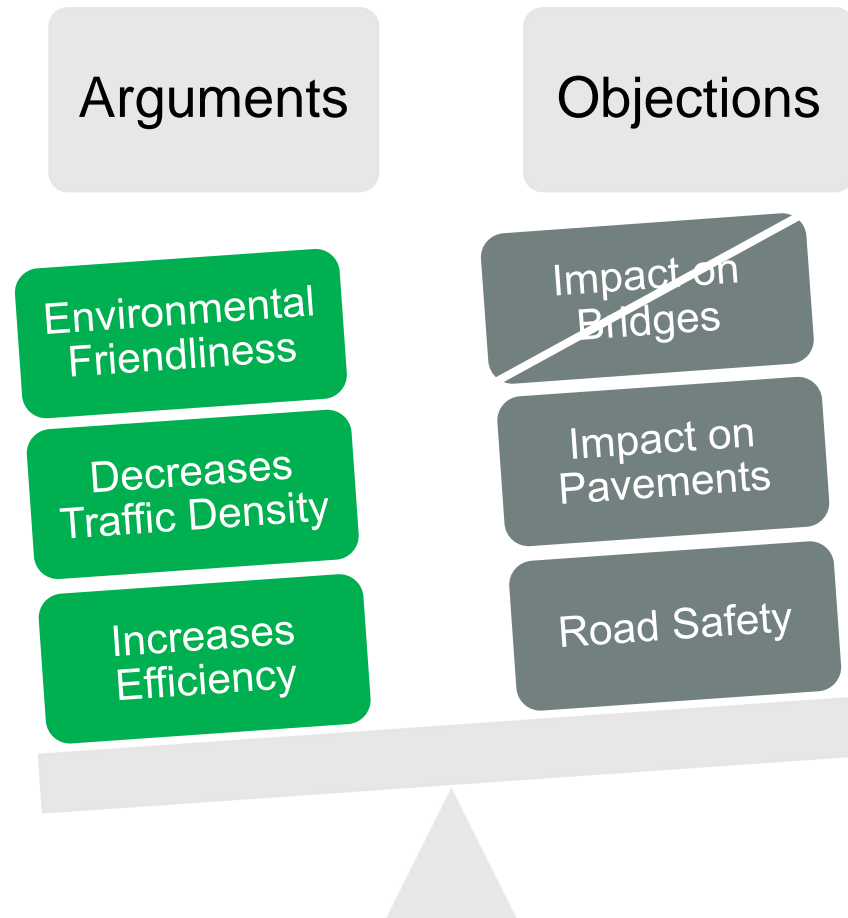
Proposed 35 tons
4-Axle Vehicle

■ Impact on Bridge Structures (III)

Results

- Concerning the longitudinal and lateral forces, the impact of the modified vehicle, compared to already permitted vehicles, is **not significantly higher**.
- Concerning normative load models, the modified vehicle is **below the assessed limit** of the bridge structures.
- Thus, **the ability of the bridges to take the modified load is sufficient and the bridges will remain safe**.
- In a very few calculated cases, the assessed limits of the longitudinal forces are exceeded by a maximum of 2 %. This “can be considered as being negligible”.
- Conclusion: **“Negative impacts during the life span of bridge structures are very unlikely”**.

■ Argumentation



■ Impact on Road Pavements (I)

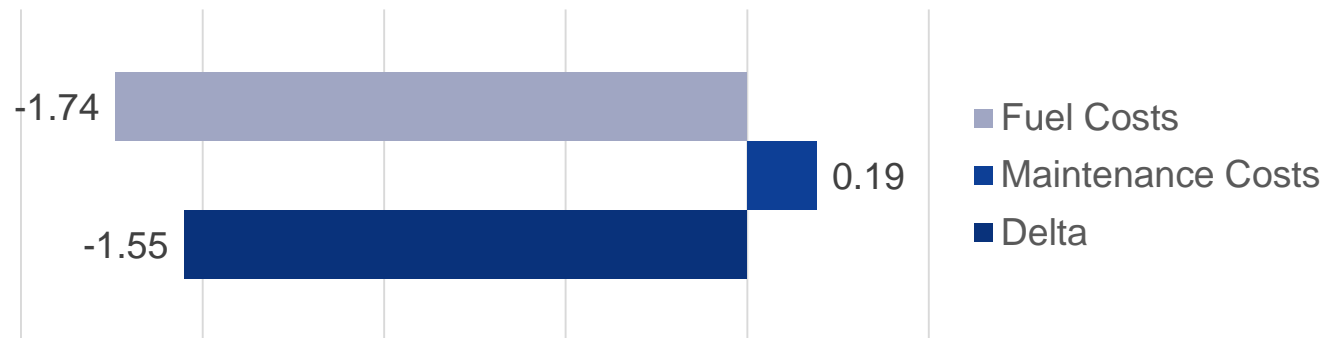
- Study examined by the **Vienna University of Technology**, commissioned by the **Austrian Ready-Mixed Concrete Association**.

■ Evaluated vehicles:

- ▶ Scenario 1: 4-axle vehicle with **32 tons** (as permitted)
- ▶ Scenario 2: 4-axle vehicle with **36 tons**
- ▶ Scenario 3: 4-axle vehicle with **39 tons**
- ▶ Scenario 4: 4-axle vehicle with **41 tons**



■ Impact on Road Pavements (II)



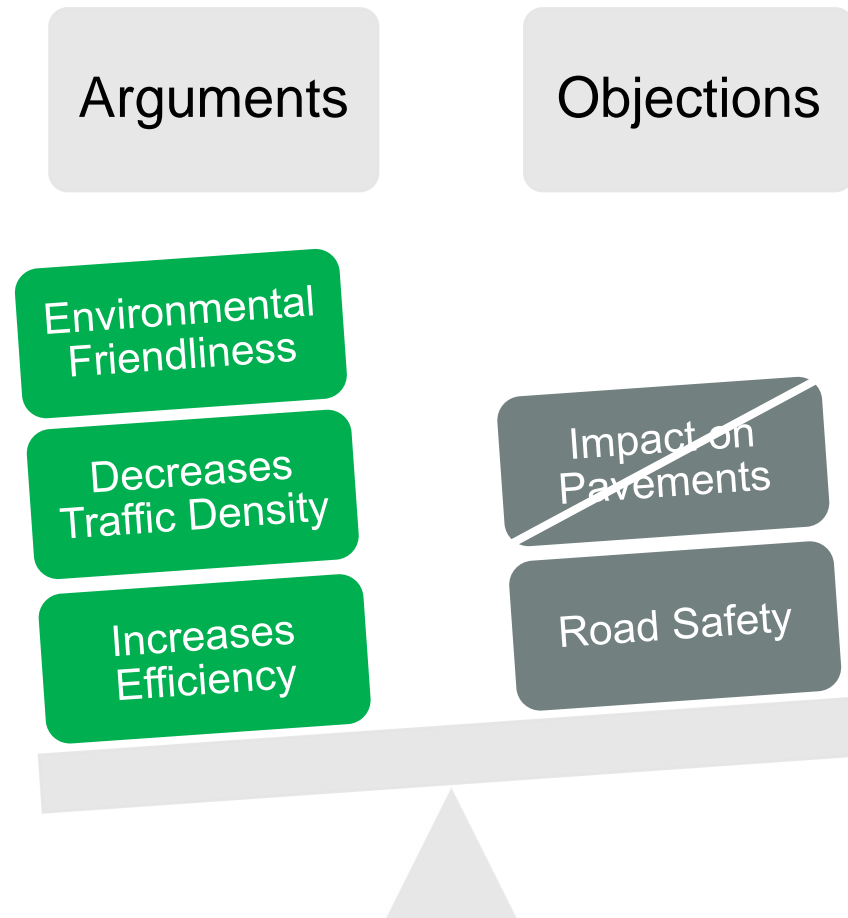
■ In the **36 tons scenario**, the annual costs for...

- ▶ **fuel** decrease by € 1.74 million,
- ▶ **maintenance** increase by € 0.19 million,
- ▶ leading to a **delta (net profit)** of € 1.55 million per year.

■ Additional costs for maintenance are overcompensated by the increase in transport efficiency.

- ▶ **Positive net effects for the national economy!**

■ Argumentation



■ Road Safety

■ Higher capacity → less turns → less traffic!

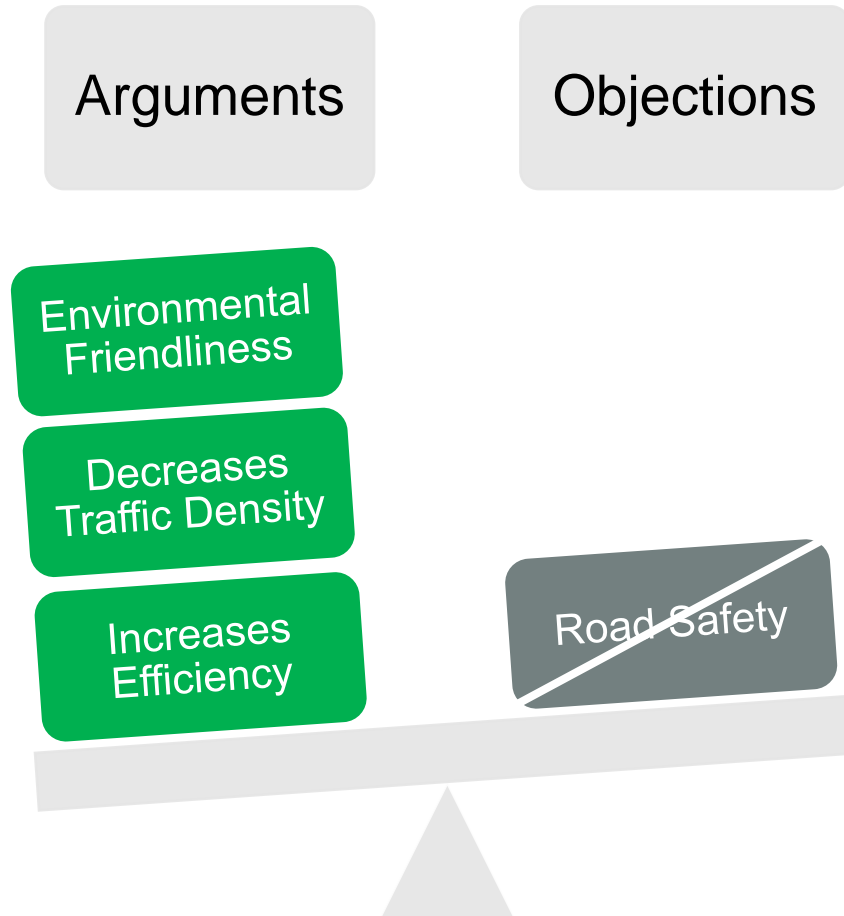
“The safest traffic is the traffic which does not exist”

■ Impact on road safety assessed by Prof. Blab (Vienna University of Technology):

- ✓ Complies with regulations on braking distances.
- ✓ No increase in danger of tipping over.
- ✓ No additional requirements on restraint systems (e.g. crash barriers).



■ Argumentation



■ Conclusion

THE ERMCO PROPOSAL IS...

- ✓ **Eco-friendly**
- ✓ **Efficient**
- ✓ **Progressive**
- ✓ **Safe**
- ✓ **Not damaging infrastructure**



■ Contact & Further Information

If you need...

- ▶ The studies (German)
- ▶ Summary of the bridge-study
- ▶ Slides of the presentation
- ▶ Written summary of the presentation
- ▶ List of arguments
- ▶ ...

...please contact us!

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